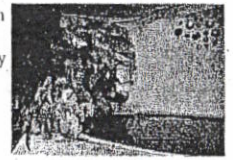
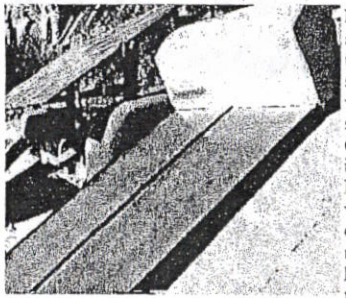
Catchwater.

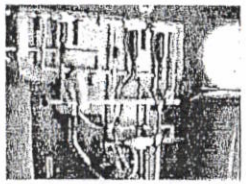
Fresh water is supplied by the design of the Earthship itself. This system provides independence from the Utility companies and allows Earthships to be built anywhere without an external water source. 10 or more inches of rainfall a year is enough to provide clean water for living.



The roof of the Earthship collects water as it rains and it drains into a cistern located either inside the Building or externally near the home. It is stored there until needed. This water can then be pumped anywhere in the house by use of conventional plumbing. Fixtures and piping are located in the greenhouse hallway to allow ease of installation and efficient design. A water control module is located near the cistern which provides pumps, filters, gauges, and a pressure tank. Solar electricity is used to power the water pumps.



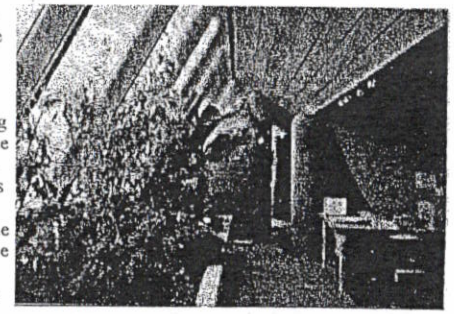
Hot water can be acquired by the use of Batch heating systems and gas hot water demand heaters. Batch heaters use the sun to heat a batch of water for use during the day. In sunny areas these are very effective. In cloudier areas a hot water on demand heater may supplement them to take up the slack. These systems are very effective and cost efficient. (Free if you have enough sun) Gas demand heaters are installed near the fixtures which need the hot water. When Hot water is needed, these units sense it and determine if the water needs additional heating. When the hot water is turned off the heaters deactivate. They are extremely efficient and many other countries use these devices exclusively for their hot water supply. Hybrid batch heater -- hot water storage tanks can be implemented to heat the water and store it for use later in the day. They are more complex and expensive but may allow for more hot water to be produced. Conventional hot water tank heaters used extensively in the US are very wasteful so are generally not considered in the independent homes.



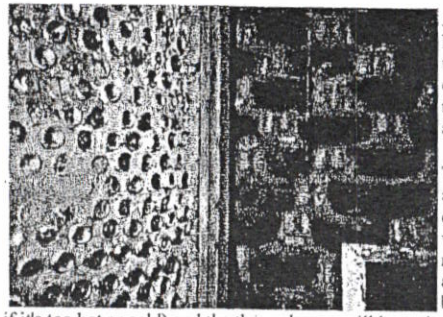
Water Organizing Module (WOM) in Weaver earthship. This system filters and delivers catchwater for household use.

Thermal Mass

EARTHSHIP



One of the main purposes in a house is to keep it's inhabitants comfortable. Earthship's achieve this effect by using thermal mass. Large - very dense materials are used in the construction of the house. These dense structures will tend to keep their temperature at a steady level resisting change. When these structures are located inside the home they passively heat or cool the home. There are a few reasons thermal mass structures usually are at the desired temperature. Since they resist change, they will be cooler during the hottest periods of the day and warmer during the coolest periods at night. Due to earthships undergroundish nature, the temperature is often much more reasonable than what it is outside.



Just 4 feet below the ground (in most areas) the Earth is a comfortable 60-70 degrees even when the temperature above ground is much more extreme. This is evident in basements where they tend to be the coolest room in the summer and the warmest in the winter.

The earth-rammed tire walls of an earthship also act as the thermal mass. The other trick is to design the home to allow the thermal mass tire walls to absorb sunlight during the day and release it as heat during the night. One great advantage of this design, is fresh outside air can be allowed to circulate through the house (even if it's too hot or cold) and the thermal mass will keep the temperatures comfortable by regulating the temp of the air. Earthships also incorporate a large amount of insulation to keep everything efficient. This design provides almost all the heating and cooling ever required. Only in very very extreme weather will other heat sources be needed

Thermal mass is a great technique to use in passive solar design. The other predominant passive design technique, super-insulation, has the drawback of creating a stuffy home unless breathable walls are incorporated like strawbale construction with natural finishings.

Renewable Energy

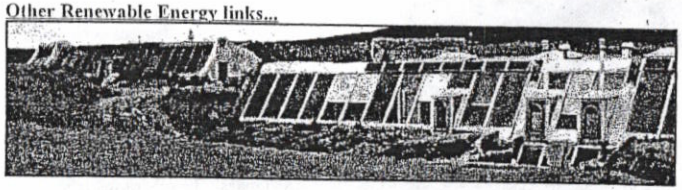
Renewable Energy such as Wind and Solar are definitely the wave of the future. Currently much of the Utility Generated Electricity we use comes from Coal and Oil. These sources are helping to destroy the planet ... Not to mention they won't be around forever. Renewable energy destroys nothing as it generates and does not consume anything (coal, oil, plutonium, money) while it operates.

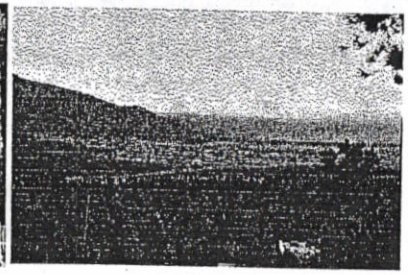
By incorporating the use of these Renewable Energies in our homes we can create a self-sufficient earth-friendly lifestyle. We no longer need to rely on others for our basic needs. Earthships completely support this type of system.

Solar Energy is produced using Solar Panels to convert sunlight into energy. Wind turbines turn generators producing energy. This energy can be stored in batteries until needed. Inverters are used to transform Solar panel/battery current into household 120v AC 60hz. New models are very efficient reaching ratings of 95percent conversion efficiency. Cheap (Money wise that is) Energy bills have led us not to care about how much energy we consume. When you produce your own energy, however, you learn the importance of efficiency and well designed systems. Off the grid homes must incorporate energy conservation in order to keep system costs under control. The more careful and efficient you are - the more power to you.

Solar Survival Architecture offers a pre-built integrated unit to take care of this for you. Many other sources are also available if you wish to learn more.

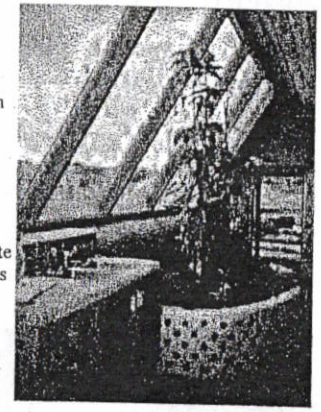
Other Renewable Energy links...





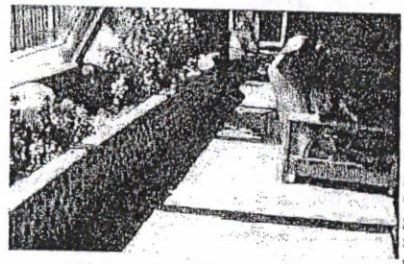
The front deck of the Weaver Earthship at Reach. View from Weaver Earthship over Taos

Greywater



Sewage is a major problem facing the Earth today. As a result of improper or poorly designed systems, much of our freshwater is contaminated. Earthships solve several problems at once by incorporating greywater recycling systems. Used (Grey) water is fed into a garden where our waste is welcomed as nutrients to plants. Whenever a sink or shower is used plants get fed and watered at the same time. Independence from outside sanitation systems means the Earthship is self sufficient. It does not rely on anyone else to take care of it's waste products. Best of all there is no sewage to deal with which means better environment all the way around.

The byproduct of all this is a healthy garden. Many types of plants especially food producing thrive in this sort of system.



So How does this system work? A chronicle has been written that goes into detail and outlines the most modern design. Also a few books have been written on greywater. The most basic system is just to have drains feed into appropriately sized planters. A 4 inch drop from drain to planter should keep everything flowing smoothly without any buildup. The greywater chronicle takes a new approach more complex approach than the older way in which greywater is fed through a grease trap (like a very small septic system) and then it flows through a mazework of fine gravel at the bottom of the planter. On top of the gravel is soil and plants. The brings the roots down to the water. Also the gravel helps filter the water on it's journey through the planter. Just about any type of system can be set up. Some very complex ones incorporate drip irrigation to the planter.

The down side to greywater systems is codes can be fairly strict in allowing there use. The main worry is that this used water can carry diseases and stuff which should just flow down the drain. Often the easiest way to appease code people is to build a traditional system and a greywater system hooked together at a diverting valve. That way it can be normal for inspection and switched to greywater whenever wanted.

Toilets are are slightly different. Composting toilets which convert waste into rich fertilizer can be used or a solar toilet designed by Solar Survival Architecture can "fry" waste into powder. The solar toilet practically desinigrates toilet "blackwater" and the leftovers are completely sterile and harmless to the environment.